DIGITAL COMPUTER NEWSLETTER

The purpose of this newsletter is to provide a medium for the interchange among interested persons of information concerning recent developments in various digital computer projects. Distribution is limited to government agencies, manufacturers, and contributors.

OFFICE OF NAVAL RESEARCH · MATHEMATICAL SCIENCES DIVISION

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The Under Secretary of the Navy
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NAVEXOS P-645

COMPUTERS AND DATA PROCESSORS, NORTH AMERICA

AFCRC MAGNETIC COMPUTER - AIR FORCE CAMBRIDGE RESEARCH CENTER - BEDFORD, MASSACHUSETTS

The machine was developed by the Univac Division of Sperry-Rand under contract with the Computer Laboratory, AFCRC. It is a two address, serial, coded-decimal, magnetic drum machine designed around diode logic and Ramey type magnetic amplifiers operating at a bit rate of 660 kc.

The word length is 10 digits plus sign, add time is 90 microseconds with minimum latency coding, input-output is presently a photoelectric tape reader and a Flexowriter. Plans are now being made to attach a 100 word magnetic core memory and a high speed printer to the machine. From July 1957 to February 1958 the useful operating time has averaged about 90% of the scheduled operating time. Two hours a day are devoted to preventive maintenance.

ALWAC III-E - ALWAC CORPORATION - HAWTHORNE, CALIFORNIA

The ALWAC Corporation has 32 ALWAC III-E computers in operation in the United States, Canada and Europe. They have 7 installations scheduled in the first quarter of 1958, and have approximately 30 additional orders. The 7 installations include: Menasco Manufacturing Co., Burbank, Calif.; Naval Research Establishment, Halifax, Canada; Litton Industries, Beverly Hills, Calif; Consolidated Electrodynamics Corp., Pasadena, Calif.; Safeway Stores, Inc., Oakland, Calif.; Cleveland Electric Illuminating Corp., Cleveland, Ohio; and Data Processing Corp., Palo Alto, Calif.

Initially Safeway will use the computer for sales analysis. Eventually it will be utilized for inventory and ordering control. Cleveland Electric's computer will be for utility billing, and Data Processing Corp's will function as a service bureau.

Some recent ALWAC III-E sales include Liggett Drug Co., New York City, for inventory control, and Pharmaceutical, Inc., Newark, New Jersey, for inventory control."

G-15 SHIPBOARD INSTALLATION - BENDIX COMPUTER DIV. OF BENDIX AVIATION - LOS ANGELES, CALIFORNIA

The Navy's USS Compass Island is a floating laboratory carrying a 4 million dollar electronic navigation setup. Except for the two G-15 Bendix computers and magnetic tape units, all equipment aboard is experimental.

The computers are being used to develop as fast and precise a method as possible for calculating latitude and longitude requirements for long-range missile launching. The magnetic tape units store the information on approximately 1500 stars—day, declination rate, ascension rate, etc. Information from special electronic equipment is automatically converted from the electrical Gray code into the binary code used by the G-15s. This information is fed directly into the computers to eliminate manual type in. The computers will determine the speed of the ship, position, time, drift, dead reckoning, etc., and compare more than one system to find the most accurate. In all, 17 programs will be coordinated in this one installation.

The ship is equipped with special stabilizer fins to minimize the pitch and roll of ocean going conditions. In an air conditioned room, the computers are rigidly bolted to the deck and side of the ship. Top-side equipment is mounted on stabilizer platforms developed by the Navy Material Laboratory. In the tests-runs held in 1957, the computers have shown no operational impairment due to pitch, roll or vibration. On the builder's test run, they were the only equipment in the electronic system not affected by heavy seas that caused 15° roll.

632 TYPING CALCULATOR - INTERNATIONAL BUSINESS MACHINES CORPORATION - NEW YORK, N. Y.

The Electric Typewriter Division of the International Business Machines Corporation has announced the IBM 632 Electronic Typing Calculator, designed primarily for the business application of invoice and order preparation. Priced at approximately $5,600, the new computer can be programmed to automatically retain and type out total gross sales, taxes, shipping charges, invoice totals, or other selected accumulations for management review, daily.

The calculator consists of an electric typewriter, a ten-key companion keyboard, a magnetic core memory within the computer unit, and a program reading device. Because numerical information, keyed in on the companion keyboard, can be added, subtracted, multiplied, rounded off, and held in memory for later processing, the equipment can automatically type, extend, carry totals, compute taxes, subtract discounts, position decimals, justify multi-digit numbers, and type out results. Instructions and decisions for a complete application are provided by a plastic tape within the program reading device. The tape can be changed for a different office procedure in a few seconds. The IBM Electric Typewriter with conventional keyboard automatically acts as the computer's output and can also be used, at any time, for general typewriting purposes. Delivery is scheduled for second quarter of 1958.

DATAMATIC 1000 INSTALLATION - MINNEAPOLIS-HONEYWELL REGULATOR CO. - NEWTON HIGHLAND, MASSACHUSETTS

Michigan Blue Cross—Blue Shield is the first organization to use the new Datamatic 1000 system. Other firms and organizations in Boston, Minneapolis, Baltimore, Washington, and Los Angeles have ordered similar systems. The equipment will keep track of the hospital and medical records of more than 1,600,000 Michigan subscribers and their families (a total of some 3-1/2 million people). It has been estimated that the daily task of searching 1,400,000 records and bringing an average of 25,000 of them up to date will take the system only two hours of each eight hour day. The remaining six hours will be used for billing operations and for compilation of Blue Cross—Blue Shield statistics.

The system reduces the amount of floor space required for record storage to a single cabinet occupying less than six square feet. With the new equipment all permanent records involving 3,700,000 members will be stored on 20 reels of 2,700 foot long tapes, each 10 inches in diameter.

NCR 304 - THE NATIONAL CASH REGISTER COMPANY - DAYTON 9, OHIO

S. C. Johnson & Son, Inc., has placed the first order for one of the NCR 304 series. Other orders have been received from American United Life Insurance Company and General Tire & Rubber Company. The United States Marine Corps has announced its intention of procuring three of the systems. The marketing of the new series (See Digital Computer Newsletter, April 1957) marks the entry of the company into the commercial computer field. Earlier electronic computers sold by NCR were designed for scientific applications rather than business use.

Johnson's Wax will use the system for order billing, accounts receivable, sales analysis, inventory, production and purchasing control, payroll and some general accounting. In addition, the equipment will be used for business research studies.

American United Life Insurance Company will use the system for file maintenance, premium billing, and collection, commission and dividend accounting. Initial applications will include accounting for company issued and re-insured policies, mortgage loans and investment securities, plus actuarial studies.

General Tire & Rubber Company will use the system for controlling, analyzing and billing orders. This includes processing all new orders for factory shipment, both to dealers and

warehouse consignment. Bills will be prepared daily for all shipments, and accounts receivable records kept for all customers.

The Marine Corps will use the three systems primarily for providing the personnel accounting data needed to efficiently manage and control the distribution of personnel, and to plan their training and promotion both on active duty and while serving in the inactive Organized Reserve. Several additional applications are planned in the areas of cost accounting, payrolling, fiscal accounting, and the management of major items of equipment in the hands of troops.

Of medium size, the NCR 304 series ranges in price from approximately $750,000 to more than $1,250,000, depending upon the components required for a given installation. A typical smaller 304 system, for example, might consist of a central data processor, a controller unit, several magnetic tape memory units, a high speed printer and its electronic controller, and a high speed paper tape reader. Larger systems will employ additional units, such as an electronic converter or high speed card reader, plus more magnetic tape memory units and additional output equipment. Delivery of the first regular production system is scheduled for 1959.

TRICE AND MULTIVERTER - PACKARD-BELL COMPUTER CORPORATION - LOS ANGELES, CALIFORNIA

TRICE* (the Transistorized Realtime Incremental Computer) has been generating stable sine waves at over 2000 cycles in real time. The Integrators and control circuitry are completely debugged and operating. The Multipliers and Digital Servos are in the throes of being debugged. A prototype system should be ready for delivery to Army Ballistics Missile Agency, Redstone Arsenal, within sixty to ninety days.

Based on the nature of the problem, the individual computing elements are interconnected by means of a plugboard. The whole system iterates at 100,000 times per second.

Increasing the number of computing elements does not affect the speed of the system since it operates in parallel and each integrator has its own memory in the form of delay lines. Another feature of the system is the ability to time share an integrator among several functions where high speed is not necessary. This feature makes possible an economy in the amount of hardware required for a given system.

The MULTIVERTER* (voltage to digital, digital to voltage converter) is in production with the first deliveries scheduled for March and April of 1958. The D series of Multiverter—which are digital to voltage converters—have been announced. These can be made in a version as small as 2" x 4" x 4" should miniaturization be required.

FLAC I AND II - RCA SERVICE COMPANY - PATRICK AIR FORCE BASE, FLORIDA

FLAC I. Operating record for the period 20 November 1957 to 20 February 1958:

Category	No. of Hours	Percent of Manned Hrs.
Data Processing	888.8	55.35
Code Checking	302.4	18.84
Analysis	49.1	3.07
Library Maintenance	51.2	3.19
Power Failure	17.2	1.08
Idle Time	2.2	.13
Preventative Maintenance	189.0	11.78
Unscheduled Maintenance	105.2	6.56
Total Manned Hours for Period	1605.1	100.00

*See Digital Computer Newsletter - October 1957

FLAC I continues to be scheduled 24 hours each day for five days each week processing missile test data.

FLAC II. Although still under Engineering control for the addition of programmed improvements, FLAC II is usually available for approximately two 8 hour shifts each day for data processing. The following is a breakdown of data processing time for the same period of time:

Category	No. of Hours
Data Processing	482.1
Code Checking	46.0
Library Maintenance	11.7
Total Hours for Period	539.8

Output Core Buffer Systems have been delivered for both computers. The unit scheduled for FLAC II is currently being installed and checked out. The Buffer will permit reading and computing while reading out to a multiple paper tape punch system. Multiple magnetic tape as an input output medium is now operational for evaluation purposes on FLAC II.

X-308-REMINGTON RAND UNIVAC - ST. PAUL, MINNESOTA

The X-308 is a general purpose modified single address digital computer using Ferractor (magnetic amplifier) logic. It has a magnetic core memory with a capacity of 4096 twenty four bit words. One feature enables the computer to operate on a whole word or any 8 bit third of a word. In this way, the computer's storage capacity is increased to 12,228 eight bit words. Addition can be performed at 25,000 per second. It can take figures from storage, perform arithmetic operations and store the answers at a rate of 1,000,000 per minute.

The functions include manipulating data, differentiating various forms of data, and performing analytic, counting and arithmetic operations. Fifty seven instructions are available to the programmer. Fifty two of these can be modified by any of seven different B-index registers. The B-index registers, sometimes called B-boxes, are used to store constants which modify instructions. In addition, one of the 15 bit B-boxes is wired as a counter for the "repeat" instruction.

Physically the computer cabinet is 96" x 33" x 68" tall, and the console is 50" x 23" x 48" tall. Overall the computer uses 225 vacuum tubes, 25,000 diodes, and 2,500 magnetic switch cores. There are 2,500 printed circuit cards, however, only 13 different types are needed.

Four X-308's have been constructed for a classified application.

BRANIFF AIRWAYS RESERVATIONS SYSTEM - TELEREGISTER CORP. - STAMFORD, CONNECTICUT

Airline reservations clerks in remote cities can now query a central electronically controlled inventory in a distant city with the use of simple teletype messages and without recourse to other personnel. In the Teleregister reservations system built for Braniff International Airways, messages sent via teletype from cities in the Braniff system are transmitted to Dallas and through the data processor. The messages, punched on teletype tape, are automatically fed by readers into the electronic data processor with a magnetronic drum containing the inventory. If space is available the drum is automatically updated. Once the flight has reached a predetermined cushion then a stop sales message is generated by the data processor and transmitted back to all offices in the Braniff system advising them that they can no longer sell seats on that particular flight. Should the operator make an error in transmitting his message then a printer at the Teleregister installation prints out the erroneous message in the Braniff Dallas message center, which can take corrective measures by advising the agent making the error. Agent Sets at the reservation control center provide a continuous visual check on the

inventory. The system employs the same teletype circuits formerly used by Braniff and still being utilized by the airline for its other routine operations.

The system is capable of handling more than 8,000,000 seat reservations per month and can sell or cancel space in less than one second (excluding line transmission time), thus greatly speeding up Braniff's service to its passengers. The 140 Braniff offices in the United States maintain an inventory on 250 flights per day for 31 days ahead. It is the first to employ teletype messages as a means of placing reservations requests and seat information directly into the electronic equipment.

Braniff pioneered the existing manual type of reservation system now used by most of the world's airlines when it introduced "Auto Sell" in 1946. Under this former system, the many and varied daily teletype messages received in the reservations center were sorted according to flight data; then routed to the proper control position within the office where they were read and interpreted by an agent who then had to take appropriate action. The agent made a pencil entry blocking a seat for each sale made or an erasure for an entry, if a cancellation was indicated. All charts had to be scanned constantly so that sales could be stopped promptly whenever available space reached a critical level. When this occurred, a message was manually prepared in the reservations center and sent by teletype to all Braniff sales offices.

This manual processing of thousands of entries on hundreds of charts was a slow and tedious operation. The new electronic system eliminates entirely the delays inherent in a manual process. Each booking message is accurately worked in a matter of seconds. When a flight reaches "sold-out" condition, a message tape stopping further sales is automatically prepared and broadcast immediately. The increased speed and accuracy in handling transactions will make it possible for our sales office to provide an improved service to our passengers. The changeover from the manual to the automatic operation was made without interruption of service.

The prime consideration in the layout of the system and the selection of components was the need for utmost reliability. The electronic part of this system was constructed in duplicate so that two systems function simultaneously in synchronism. Automatic check equipment continuously compares the performance of one electronic system against the other. For preventive maintenance routine checks are made and test patterns introduced daily into the central equipment as part of the Teleregister maintenance service.

Teleregister has provided especially designed automatic reservations systems for other airlines including American, National, Northeast, Pan American and United, and is building systems for TWA and Western Air Lines. The corporation also is building reservations systems for three major railroads, the New York Central, New Haven, and Santa Fe, as well as automatic savings account systems for three major mutual savings banks: The Howard Savings Institution of Newark, New Jersey; the Society for Savings in Hartford, Conn., and the Union Dime Savings Bank in New York City. They have also recently inaugurated automatic hotel reservations space for the Sheraton Corporation of America, and built an inventory control system for the B. F. Goodrich-Hood Rubber Company plant in Watertown, Mass.

COMPUTING CENTERS

SIMULATION AND COMPUTATION DIVISION - AIR FORCE MISSILE DEVELOPMENT CENTER - HOLLOMAN AIR FORCE BASE, NEW MEXICO

The Simulation and Computation Division, Directorate of Research and Development, Air Force Missile Development Center, Holloman Air Force Base, New Mexico has received its second 1103A Univac Scientific Computer (see Digital Computer Newsletter, October 1957), which is now being checked out.

The two digital computers are being used in conjunction with research and development of a Real Time Missile Performance Analysis System at AFMDC.

COMPUTATION CENTER - ARMA DIVISION OF AMERICAN BOSCH ARMA CORPORATION - GARDEN CITY, N. Y.

The ARMA Division has recently installed a Computational Center. The center has a Datatron digital computer, and a GEDA analog computer.

These are used for research, development, and design activities in the following areas: Systems analysis of weapon control systems, navigational systems, missiles, and simulation of complex problems involved in basic, high precision components; Design and development of gyroscopes, accelerometers, servos, special purpose digital computers (airborne and fixed location), and feedback systems.

LOGISTICS RESEARCH PROJECT - GEORGE WASHINGTON UNIVERSITY - WASHINGTON, D. C.

The Project has received delivery from Advanced Electronics Manufacturing Corporation, Los Angeles, California, the Input-Output Buffer Store noted as having been contracted for in the April 1957 Digital Computer Newsletter. It is currently being checked out.

Card input output to and from this buffer will be handled by means of an IBM 077 Collator and 523 Summary Card Punch; tape input output by means of two Ferranti readers and two teletype tape punches.

This equipment is capable of composing from each IBM card a total of 80 digits of Logistics Computer entries and of supplying them to the computer registers for processing, one entry at a time. Both the entry lengths and the sequence code which designates a program starting point may be varied from card to card, and within a card when more than one entry is to be read from a card.

Output may be made up of blocks routed to it directly from input data and of data resulting from computation.

The two collator feeds and the two Ferranti readers operate on random call from the computer.

AEC COMPUTING AND APPLIED MATHEMATICS CENTER - NEW YORK UNIVERSITY - NEW YORK, NEW YORK

The AEC Computing Center at NYU has now been assigned the primary objective of research in computing methods and applied mathematics in general as related to the solution of problems in the many fields of AEC interest. At the present time the emphasis is on work in multi-dimensional fluid flow and shock waves, Monte Carlo neutronics, reactor mechanics, magnetohydrodynamics, and general studies in numerical analysis, especially the solution of partial differential equations.

Under this program there will be no charge to AEC contractors for machine time on either the UNIVAC or IBM 704 for problems deemed appropriate to the overall objectives of the Center. Contractors of other government agencies will be given machine time as available for approved problems at established hourly rates.

Inquiries should be addressed to Professor H. J. Greenberg, Associate Director, AEC Computing and Applied Mathematics Center, 4 Washington Place, New York 3, N. Y. ORegon 7-0200.

NUMERICAL ANALYSIS DEPARTMENT - RAND CORPORATION SANTA MONICA, CALIFORNIA

Installation of the first IBM Type 738 core memory for the 704 was complete[illegible] The 738 contains 32,768 thirty-six bit words. This memory unit has been function[illegible] since its installation, and has served to speed up many routines by a factor of five or [illegible]

During March 1957, a new high speed transistorized logical adder was installed in the JOHNNIAC (a Princeton-class computer built by RAND). To date, no transistor failures have occurred and the total number of transistor-hours now exceeds 10^7. RAND has also completely transistorized the control for a new high speed printer installed in the JOHNNIAC in November 1957. The printer, built by ANelex, provides 136 columns (only 120 are presently in use) at 10 to the inch, with 56 characters per column. Maximum speed is 1200 lines per minute.

The Rand analog facility was considerably modified during the year and the computer was subsequently renamed TRAC (for The RAND Analog Computer). The system now includes electronic multipliers (with 64 associated amplifiers), function generators, 80 amplifiers, 2 X-Y plotters, digital readout, and servo resolvers. All components are connected to a single large plugboard.

A complete range of data processing services, including analysis, programming, coding and operation of the 704 with the expanded of core storage, is available from RAND. Rates for the computer, associated peripheral equipment, or the services of the staff, are available on request.

COMPUTING LABORATORY - SOUTHERN METHODIST UNIVERSITY - DALLAS, TEXAS

Southern Methodist University has opened a Computing Laboratory on its campus. A new building houses the Univac Scientific 1103 Computer, the Remington Rand Service Bureau and the S.M.U. Computing Laboratory offices and classrooms.

The computer is operated jointly by Remington Rand as a service to industry and by S.M.U. as an academic service for research and teaching. The operation is associated with the University's New Graduate Research Center. Professors and students have free use of the machine for academic research and training in computer work. Training programs are available for faculty and students. Computing projects are now underway in fields of engineering, mathematics, psychology, law, religion, management, and others.

S.M.U. regards its laboratory as a regional university computing facility, and will make the computer available to other universities and nonprofit institutions on a cooperative arrangement involving only a nominal fee for overhead. Inquiries leading to such use of the machine are invited.

COMPUTATION CENTRE - UNIVERSITY OF TORONTO - TORONTO, CANADA

Since FERUT's installation in the spring of 1952 at the McLennen Laboratory Computation Centre, an impressive list of computations has been carried out with it, but the last five years have seen computer changes which have made it an obsolete machine. Recently a number of companies, among them the International Business Machines Co., has been offering to universities computers on generous terms. It has therefore been decided to replace FERUT with an IBM Type 650 Machine, with alphabetical device, auxiliary floating point, index accumulators, and magnetic tapes. This system will provide at somewhat less cost a computing facility of appreciable greater capacity than FERUT, and one which is in the line of the present developments and therefore more suitable for teaching.

The Centre realizes that many users have made a significant investment in FERUT programs but feels there is available a very large library of 650 programs which will, in a short time, more than offset the losses due to the change. At the Centre they are now setting up a library system and a method of routine organization which will eventually be distributed to potential users. There will be included a simplified programming system for those persons who have been operating on FERUT with Transcode. To partially offset the cost of rewriting programs from FERUT to 650 no charge will be made for developing and testing an existing FERUT program which is being translated to 650 language. The 650 is scheduled to arrive at Centre on 1 May 1958.

DATA PROCESSING CENTER - U.S. ARMY, CHIEF OF ENGINEERS - WASHINGTON, D. C.

An Engineer Data Processing Center as a field agency of the U. S. Army Corps of Engineers has been established to apply automatic data processing techniques and equipment in the handling of reports and statistical data, and in solving various engineering and computational problems.

The Center, presently located in Building T-7, Gravelly Point, Washington, D. C., will also coordinate all activities at Corps of Engineers data processing installations.

NAVAL ORDNANCE COMPUTATION CENTER - U. S. NAVAL PROVING GROUND - DAHLGREN, VIRGINIA

NORC Tape Reliability. It is believed that the magnetic tape system associated with the Naval Ordnance Research Calculator (NORC), has been in operation longer than any other tape system of comparable high performance. The following statistics on its reliability may therefore be of interest to those contemplating the use of the newer high-performance tape systems.

Achievement of good performance with the NORC tape system requires high standards of mechanical maintenance, tape cleanliness, and the use of pre-tested tapes. On the basis of number of bits transferred, it is believed that the error rate of the NORC system compares favorably with conventional systems having lower information transfer rates.

Statistics - NORC Tape System 1956-1957.

1. Operating time (excluding scheduled maintenance, idle time, operator error, etc.):	9703 hrs.
2. Total number of tape system errors:	2916
3. Time lost due to tape system (includes repair time, error correction, rerun):	301.5 hrs.
4. Mean free time between errors:	3.3 hrs.
5. Percent of scheduled time lost due to tape system:	3.1 %
6. Average time lost per error:	6.2 min.
7. Estimated reading and writing time as a per cent of scheduled operating time:	15 %
8. Estimated number of bits transferred per error:	3.5×10^8

9. Estimated breakdown of error repair, methods, and causes:

Method of Repair	% of Total Errors	Possible Cause
a. Reposition and re-read	10	Skew, failure of read or check circuits, first evidence of tape wear, loose dirt
b. Clean error area on tape with solvent, reposition and re-read	20	Dirt on tape
c. Reposition or restart and rewrite (possibly clean tape or replace worn tape)	70	Wear on tape, dirt on tape (seldom), failure of write circuits (very seldom)

10. Tape system characteristics:

a. transfer rate	70,000 digits/sec. (= 280,000 bits/sec.)
b. density	510 bits per/in. (each track)
c. linear speed	140 in./sec.
d. data structure	binary-coded decimal in 4 parallel tracks
e. recording method	non return to zero (polarity change on binary zero), self clocking
f. method of error detection	modulo four count of bits present in the 64 bit word, and comparison with stored bit count
g. number of tape units	10, including 8 on line, 1 on Card Converter, 1 spare

COMPUTER CENTER - U. S. NAVY ELECTRONICS LABORATORY - SAN DIEGO, CALIFORNIA

Although only four months old, the Datatron 205 in the NEL Computer Center has already been put on a two shift operation. Due to the nature of the contract, which allows unscheduled "down-time" to be reallocated, and the ingenuity of the NEL programmers, the computer has now been operated for a total of 712 hours with a loss of only 2.5 hours, due to power failure, and no loss at all to idle time.

The statistics for the first four months of operation are:

	Problem Solution		Program Testing		Demonstration		Power Failure		Idle Time		Total Time
	Hrs.	%	Hrs.	%	Hrs.	%	Hrs.	%	Hrs.	%	Hrs.
Oct 1957	26	46	29	52	.5	1	.5	1	0	0	56
Nov 1957	107.5	61	63.0	36	3.5	2	2.0	1	0	0	176
Dec 1957	108.5	62	65.8	37	1.7	1	0.0	0	0	0	176
Jan 1958	208.2	68	94.3	31	1.5	1	0.0	0	0	0	304

The computer was delivered 7 October and installation completed 22 October, giving a single shift availability of 56 hours for that month. Second shift operation was authorized on 10 January 1958, increasing the normal 176 hours by 128 for the remainder of the month.

During December a floating point unit was installed, primarily to speed the work of "Open Shop" programmers.

COMPUTERS, OVERSEAS

CENTER OF ELECTRONIC CALCULUS - UNIVERSITY OF NAPLES - NAPLES, ITALY

The Center has been operating for about a year in the School of Engineering at the University of Naples. It is equipped with a Bendix Digital Differential Analyzer, Model D-12 purchased by the Italian Ministry of Public Education with E.R.P. funds.

Calculations are made for both scientific institutes and industries, mainly in the aviation field, as the calculating machine installed is particularly suitable in this latter field.

The Electronic Calculus Center of the University of Naples is under the direction of Prof. Dr. Savastano, with the cooperation of Drs. Napolitano, Vinciguerra and Spampinato. It should be noted that the above Center is the first in Europe equipped with a DDA computer.

DIGITAL COMPUTING CENTER - POLITECNICO - MILANO, ITALY

The Digital Computing Center has been in operation since 1954. It is equipped with a CRC 102A connected with a magnetic tape unit; input output is provided via punched paper tape and Flexowriter.

The Center comprises an electronic division and a numerical division. The electronic division provides maintenance and modification services for computer. Modification to date include:

1. Special orders for automatic decimal to binary and binary to decimal conversions for fixed point numbers. Automatic fill and punch of numbers with or without conversion is also now possible.

2. A counter order, useful in programming loops; this order may also be used as an instructions modifier, sometime with automatic reset (i.e. transfer of a track into another may be obtained with only two instructions).

3. Test bits orders, an extension of the original test overflow.

4. Floating point add, subtract, multiply instructions. Magnitude is represented by absolute value and sign with 33 bits; the exponent is represented by one's complement form, with 8 bits.

In addition to these major modifications several others were accomplished to increase the reliability. The doubling of the magnetic drum memory positions (from 1024 to 2048) is now in progress.

The numerical division has developed subroutines and programs of general interest (matrix algebra, algebraic equations, differential equations, etc.).

Among many others, the following problems were studied:

1. Numerical solution of Laplace and Poisson equations. By making extensive use of magnetic tape, armonic fields giving rise to systems up to 700 unknowns were computed. The problems solved were originated from the study of electrical fields, also with non-homogeneous

dielectrics. Excellent experience was attained in techniques for speeding up the convergence. New iterative methods were also studied.

2. Experiments in critical computations of two groups, several regions, spherical reactors—especially suited for small computers.

3. Analysis of the molecular structure of thallium sulphide and of dichetene, by trial and error methods.

4. Evaluation of systems of boolean algebraic equations; of the number of loop in electrical networks; of the generalized ovals of finite desarguesian plane.

Computing Facilities. Problems are accepted for solution from scientific laboratories of universities and from industrial organizations, mainly of northern Italy. Several customers have their own programmers.

Teaching. The students of the Engineering School are offered courses in numerical analysis, analog and digital computers, and programming.

COMPONENTS

INPUT DEVICES - COLEMAN ENGINEERING COMPANY, INC. - LOS ANGELES, CALIFORNIA

Coleman has announced 3 types of digital input units.

The Flexowriter Input Unit is designed to accept digital input data, program the desired format, and scan the digital information into a Flexowriter-Tape Punch combination modified to permit input from an external source. Model NV-56, with sufficient capacity to scan up to 56 information bits (decimal digits, command symbols, etc.) can provide any code (8 channels maximum) and permits changes in format to be made readily by means of a patching program plug. The unit incorporates a plug-in printed circuit coding matrix. The Flexowriter Input Unit coupled to the Modified Flexowriter and Tape Punch provides a complete package that transforms numerical input into a visual record (typewritten copy), as well as a punched tape record suitable for computer input.

The Tape Punch Input Unit mounts directly on a motorized Tape Punch manufactured by Commercial Controls. The integral unit accepts digital input data, programs the desired format, and scans the digital information into the tape punch. Designated Model CCV-40, the unit features a patching program plug to permit format changes to be made easily, capacity up to 40 information bits (digits, command symbols, etc.), and a diode matrix to provide any desired code up to 8 channels.

The Typewriter Input Unit is designed to operate with an IBM "Output Writer" or other solenoid operated electric typewriter directly. The unit includes a patching program plug the arrangement of which is easily variable and which determines the format of the typewritten copy. The combination of Input Unit and Typewriter form a "usable as is" package that needs only the digital input to form a working system. Two models, each complete with 90 volt DC power supply, are available: Model AV98 with capacity of up to 98 bits of information (digits, tabs, carriage return, etc.), and Model AV48 with capacity of up to 48 bits of information.

HD-FILE DRUM - LABORATORY FOR ELECTRONICS, INC. - BOSTON, MASSACHUSETTS

The HD-FILE DRUM is a high density random access bulk storage device with wide application to data processing systems. It stores 1040 bits per inch on 320 tracks (20 tracks are

spares), for a total of 16 million bits. Access time to stored data is 180 milliseconds (average). The unit consists of a file drum, the drive and lubrication systems, a 3 by 10 by 10 track-selection mercury relay matrix, a linear read-out preamplifier, and a final writing amplifier. The file drum 16 inches in diameter and 14 inches tall, is completely enclosed and sealed.

All components approach telephone quality, and are designed for maximum trouble-free life. For example, the drum itself, dynamically balanced at 1800 rpm, is ground and lapped by optical techniques to a surface finish better than one microinch rms. The operating faces of each double head are optically ground and lapped so that the two surfaces are flat and coplanar to one wavelength of light. This attention to detail extends to all components to achieve the high performance and reliability of the file drum.

The complete unit is 48 inches long by 29 inches wide by 48 inches high and weighs approximately 700 pounds.

HIGH SPEED CIRCUIT CHECKER - MELLONICS - TUCSON, ARIZONA

Until recently, absolute checking of large arrays of point-to-point wiring has been either impossible or impractical. Point "a" is checked against point "b" to prove interconnection, but are there any incorrect connections or shorts between "a" and any of the other terminals? In large systems, this question has been unanswerable because the number of possible interconnections becomes astronomical.

Mellonics has manufactured the first fully automatic, high speed circuit checker capable of making necessary and sufficient checks for complete wiring verification. It has been installed at the Systems Division of Beckman Instruments, Anaheim, California. Operating speed is 30,000 to 60,000 circuit tests per minute. For some applications, even higher speeds are realized.

They employ the checker for proving out printed circuit drawer modules used in their Type 112 Data Processing Systems. As many as 40 slide-in printed circuits plus back connectors exist in one module, and the maximum number of terminals is about 1500. To make a complete check on one of these modules involves over one million wiring combinations. The new circuit checker will do this job in 10 to 20 minutes. Simpler systems, such as large cable harnesses, can be checked in a minute, or less.

The principle of the device is based on the use of punch cards to both program the checker and store the pattern of correct wiring connections. Setup time is zero, and the different kinds of equipment can be checked out as fast as they can be connected to the checker.

MISCELLANEOUS

ALWAC USERS' ASSOCIATION

In June 1957 in Washington, D. C., the Alwac Users' Association was formed for the purpose of exchange of ideas, routines, and technical material in connection with the use of Alwac electronic digital computer systems. A second meeting was held in New York in November 1957, and a spring meeting is planned for May 14-16, 1958 in Cleveland, Ohio.

Participation is open to organizations and individuals using or planning to use computing and/or data processing facilities consisting of the Alwac computer and related peripheral equipment. Interested persons may contact the President, Dr. C. G. Veinott, Reliance Electric and Engineering Company, Cleveland, Ohio, or the Executive Secretary, Mr. Henry Millang, Alwac Corporation, 10 Columbus Circle, New York, New York.

In addition to scheduled meetings, the Association sponsors a journal, TRADE (Techniques and Routines: Alwac Data Exchange), to facilitate further exchange of information among Alwac users. Communication concerning TRADE may be addressed to the Editor, Miss Bertha P. Harper, Personnel Research Branch, The Adjutant General's Office, Department of the Army, Washington 25, D. C.

ELECTRODATA DIV. OF BURROUGHS CORP. - PASADENA, CALIFORNIA

Burroughs Corporation set a new record in December when it shipped nine Datatron electronic data processing systems and other computing equipment, valued at $3,600,000, from its ElectroData Division Plant. The increased year end volume reflected customer ability to accept and install systems, rather than expanded production. The division's previous delivery record of six computer systems in one month was set in March 1957. Total shipments for the year were up 50 percent over 1956. Burroughs has installed 245 computer systems nationwide, including the medium-sized Datatrons and desk-sized E101s.

CONTRIBUTIONS FOR DIGITAL COMPUTER NEWSLETTER

The Office of Naval Research welcomes contributions to the NEWSLETTER. Your contributions will assist in improving the contents of this newsletter, and in making it an even better medium of exchange of information, between government laboratories, academic institutions, and industry. It is hoped that the readers will participate to an even greater extent than in the past in transmitting technical material and suggestions to this Office for future issues. Because of limited time and personnel, it is often impossible for the editor to acknowledge individually all material which has been sent to this Office for publication.

The NEWSLETTER is published four times a year on the first of January, April, July, and October, and material should be in the hands of the editor at least one month before the publication date in order to be included in that issue.

The NEWSLETTER is circulated to all interested military and government agencies, and the contractors of the Federal Government. In addition, it is being reprinted in the Communications of the Association for Computing Machinery.

Communications should be addressed to:

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